

Development of Drug Delivery Using Modified Cell-Penetrating Peptides

【Keywords】

Cell-
Penetrating
Peptide

Drug Delivery

Antibody

Caveolae

Endocytosis

■Summary

There is a growing demand for technologies that efficiently introduce macromolecules, such as antibodies and proteins, into cells. We have developed a "modified cell-penetrating peptide (Pas2r12)" that can introduce macromolecular proteins, including antibodies, into the cytosol of cultured cells (Fig. 1). Currently, we are analyzing the mechanism of cargo protein introduction into the cytosol by Pas2r12. In the future, we aim to advance to targeted delivery utilizing specific receptors and to apply this technology for live cell imaging using antibodies.

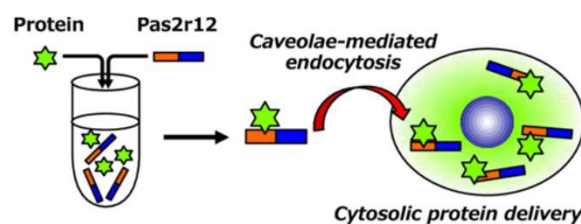


Fig. 1 Cytosolic Delivery of Proteins by Pas2r12 Pas2r12 introduces proteins into the cytosol via caveolae-dependent endocytosis.

Okuda A. *et al.* 2019, 20, Biomacromolecules

■Subject Details/Topic

The modified cell-penetrating peptide (Pas2r12) that we developed can introduce Enhanced Green Fluorescent Protein (EGFP, 26 kDa) and Immunoglobulin G (IgG, 150 kDa) into the cytosol of HEK293 cells (human embryonic kidney) (Fig. 2). The main pathway for introduction involves "caveolae-dependent endocytosis," and the cytosol introduction rates are approximately 30% for EGFP and 15% for IgG.

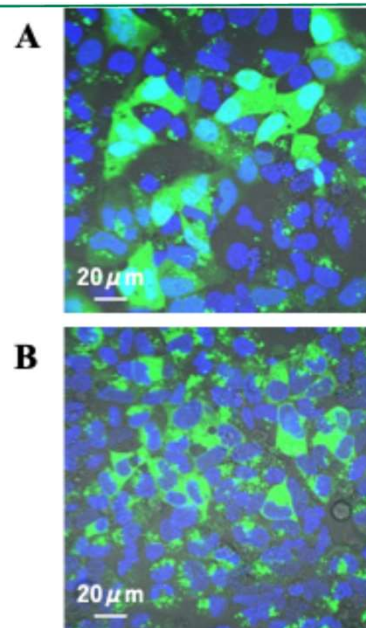


Fig. 2 EGFP and IgG Introduced by Pas2r12 Using confocal laser microscopy, the diffusion of EGFP (A) or IgG-AF488 (B) into the cytosol by Pas2r12 was observed in living cells. Blue indicates the nucleus.

Advantages over competing research:

- Understanding of the introduction mechanism and analysis skills.
- Potential for targeted delivery

Expected applications:

- Live cell imaging
- In vivo delivery combined with nanoparticles

■We hope to collaborate with...

- Field of biopharmaceutical development
- Field of intracellular imaging tool development

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